Service Schematics



RM-159/RM-245

Introduction

IMPORTANT:

This document is intended for use by authorized NOKIA service centers only.

"Service Schematics" was created with focus on customer care.
The purpose of this document is to provide further technical repair information for NOKIA mobile phones on Level 3/4 service activities.
It contains additional information such as e.g. "Component finder".
The "Signal overview" page gives a good and fast overview about the most important signals and voltages on board.
Saving process time and improving the repair quality is the aim of this document.
It is to be used additionally to the service manual and other training or service information such as Service Bulletins.

All measurements were made using following equipment:

Nokia repair SW	: Phoenix version 2006.34.2.156
Oscilloscope	: Fluke PM 3380A/B
Spectrum Analyzer	: Advantest R3162 with an analog probe
RF-Generator / GSM Tester	: Rhode & Schwarz CMU 200
Multimeter	: Fluke 73 Series II

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If the reader finds any errors, NOKIA shall be notified in writing.

Please send E-Mail to: training.sace@nokia.com



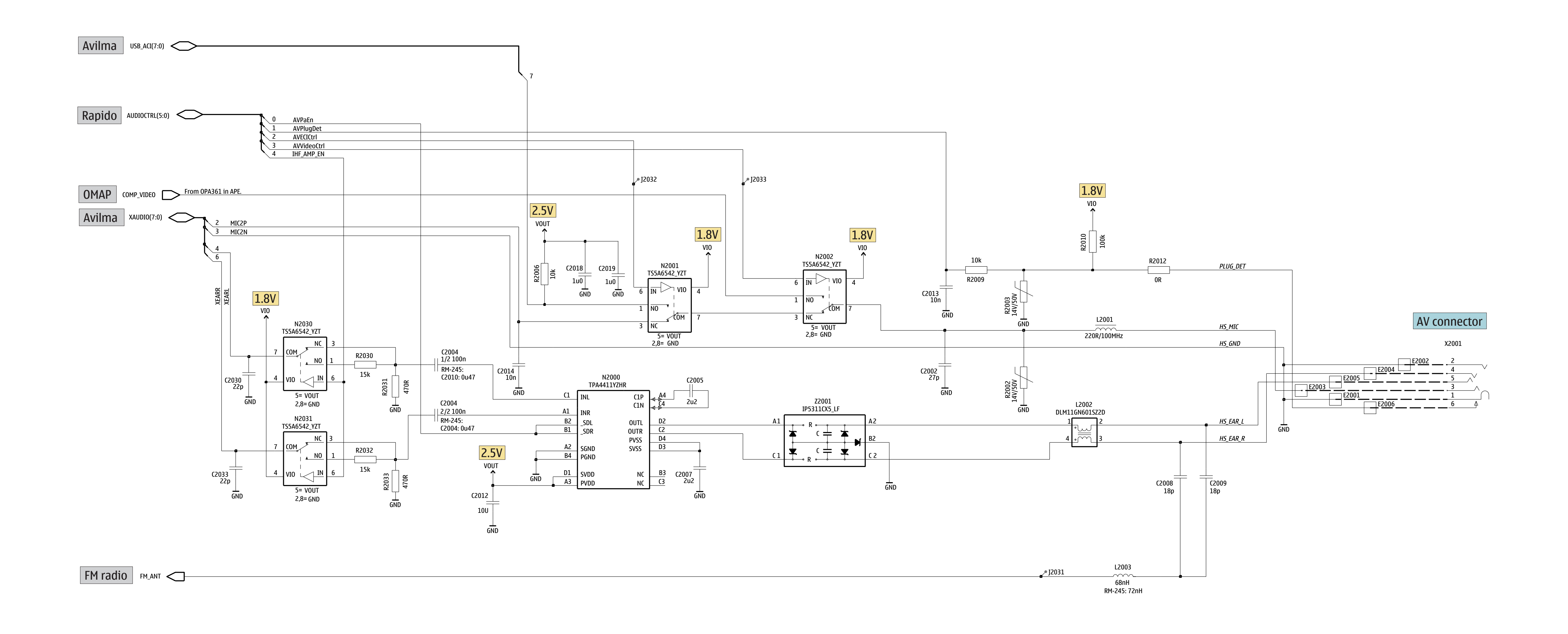
A NEW FEATURE FOR ON-LINE USE

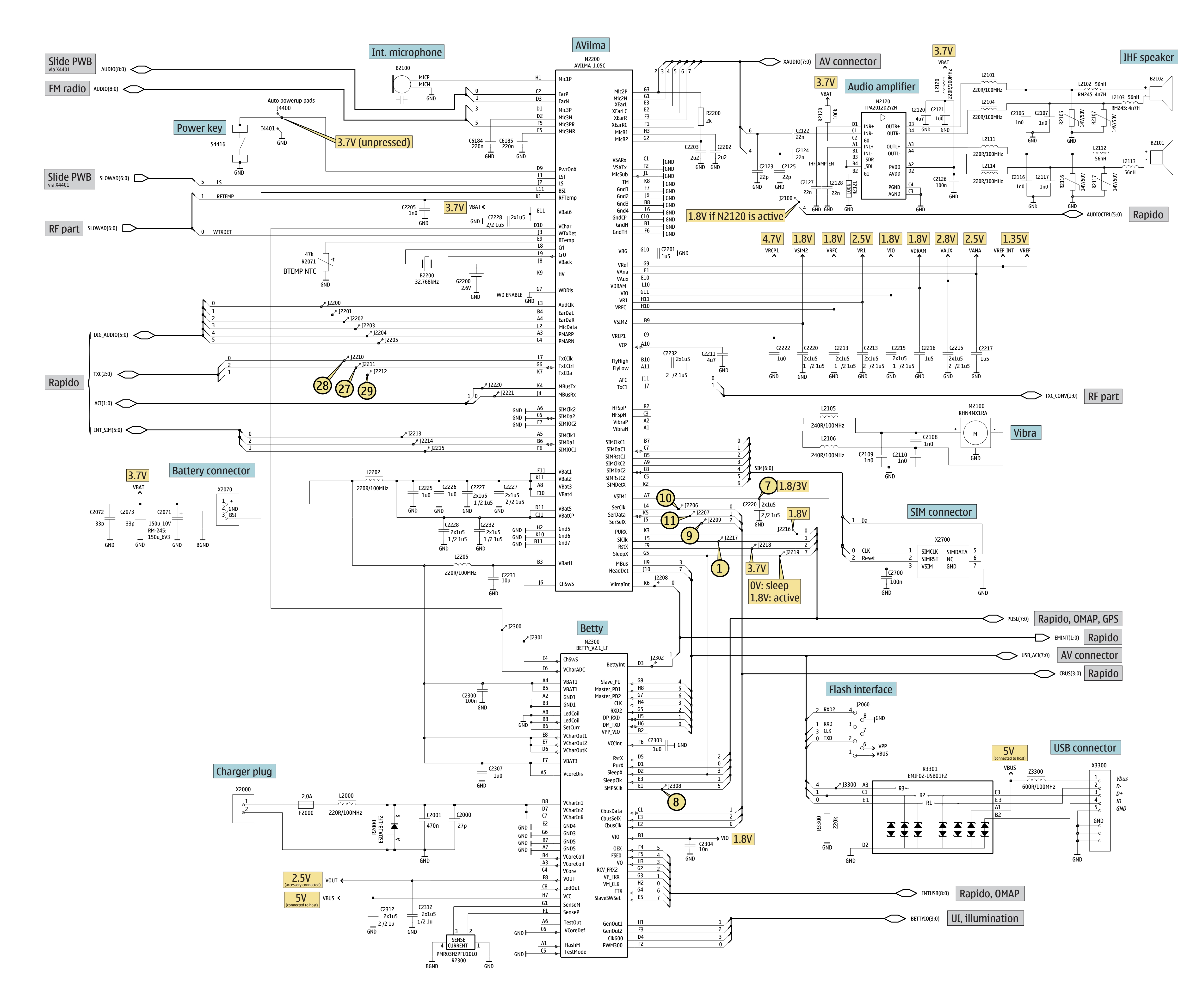
We have now linked those measurement points (1) which are related to the ocsillograms shown on the signal overview page. As example: clicking on the measurement point (1) guides you to the matching oscillogram on the signal overview page. The next click onto the now shown signal guides you to the related measurement point on the module. Finally, a third click, now onto the measurement point (1) on the module, takes you back to the starting point inside the schematics.

Do you have further improvement ideas or would like to give us feedback?
Please send an email to: training.sace@nokia.com

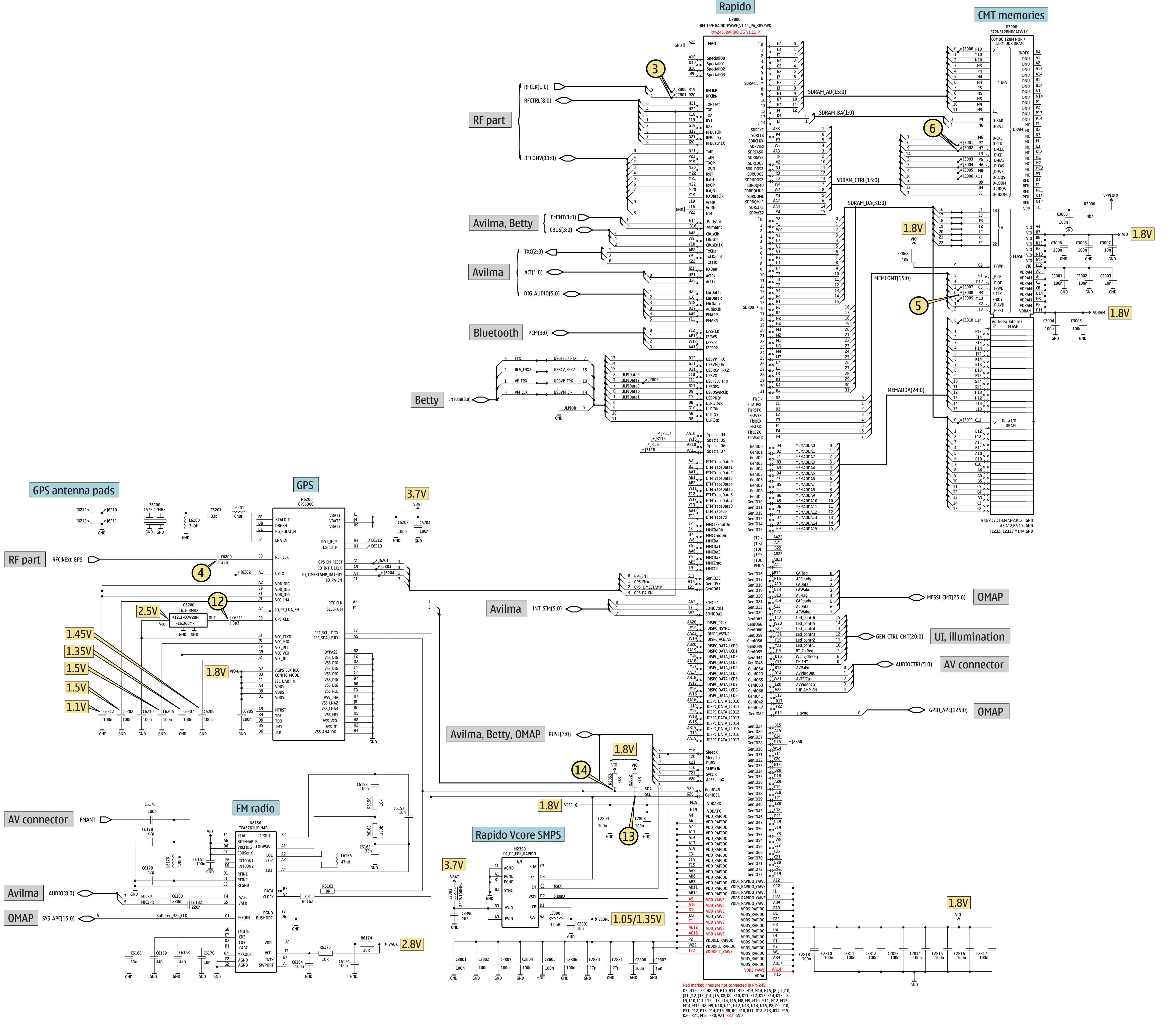
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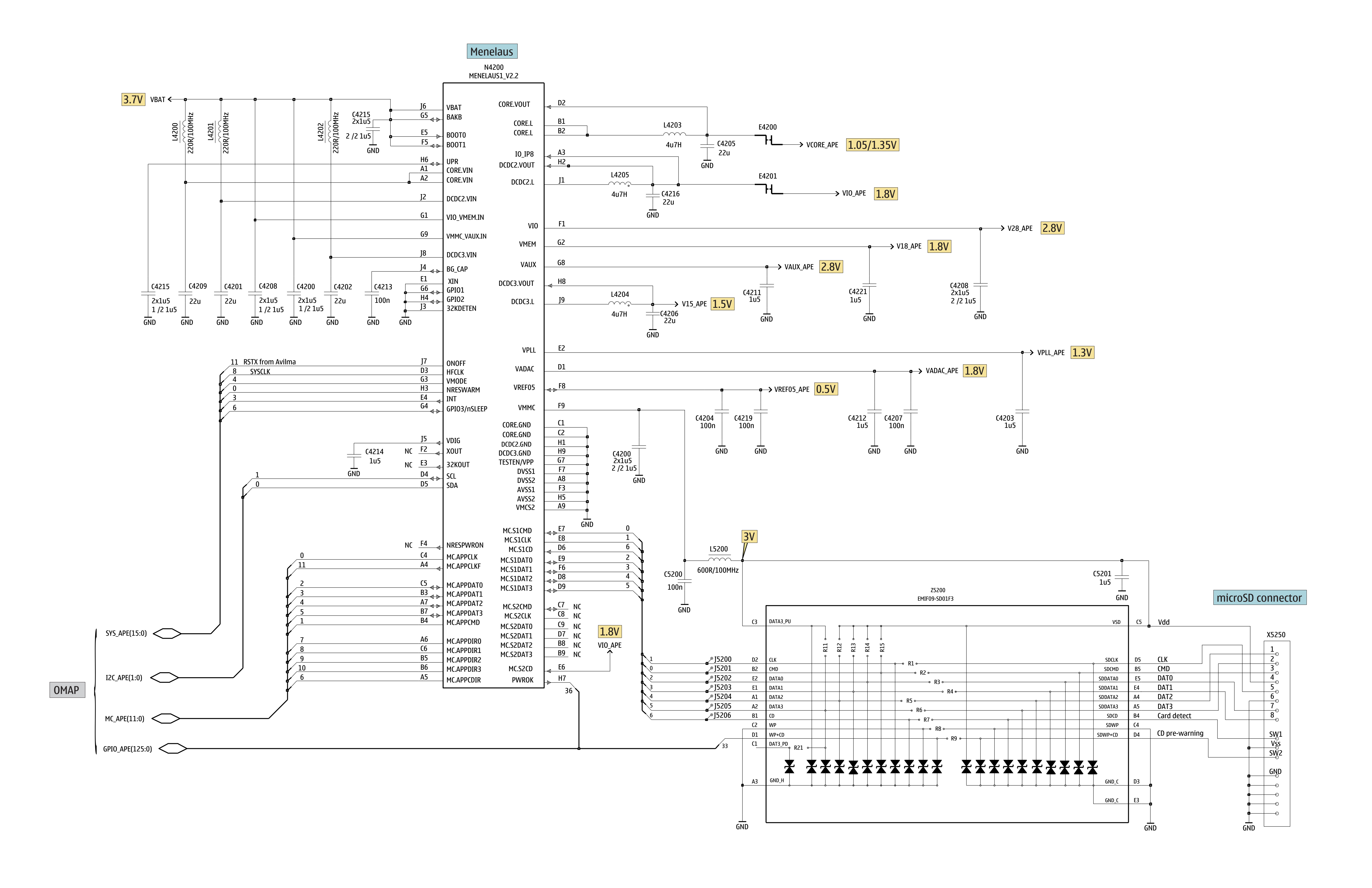
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Avilma
USB_ACI(7:0)
7
Rapido
AUDIOCTRL(5:0)
0 AVPaEn
1 AVPlugDet
2 AVECICtrl
3 AVVideoCtrl
4 IHF_AMP_EN
J2032
J2033
OMAP
COMP_VIDEO
From OPA361 in APE.
Avilma
XAUDIO(7:0)
2 MIC2P
3 MIC2N
4
6
XEARR
XEARL
1.8V
VIO
N2030
TS5A6542_YZT
NC
COM
NO
VIO
IN
5= VOUT
2,8= GND
C2030
22p
GND
R2030
15k
R2031
470R
N2031
TS5A6542_YZT
R2032
15k
R2033
470R
C2033
22p
C2004
1/2 100n
RM-245:
C2010: 0u47
C2004
2/2 100n
RM-245:
C2004: 0u47
C2014
10n
2.5V
VOUT
R2006
10k
C2018
1u0
C2019
1u0
N2001
TS5A6542_YZT
N2002
TS5A6542_YZT
N2000
TPA4411YZHR
INL
INR
_SDL
_SDR
SGND
PGND
SVDD
PVDD
C1P
C1N
OUTL
OUTR
PVSS
SVSS
NC
C2005
2u2
C2007
2u2
C2012
10U
Z2001
IP5311CX5_LF
C2013
10n
C2002
27p
10k
R2009
R2010
100k
R2012
0R
R2003
14V/50V
R2002
14V/50V
L2001
220R/100MHz
PLUG_DET
HS_MIC
HS_GND
L2002
DLM11GN601SZ2D
HS_EAR_L
HS_EAR_R
C2008
18p
C2009
18p
AV connector
X2001
E2002
E2004
E2005
E2003
E2001
E2006
FM radio
FM_ANT
J2031
L2003
68nH
RM-245: 72nH

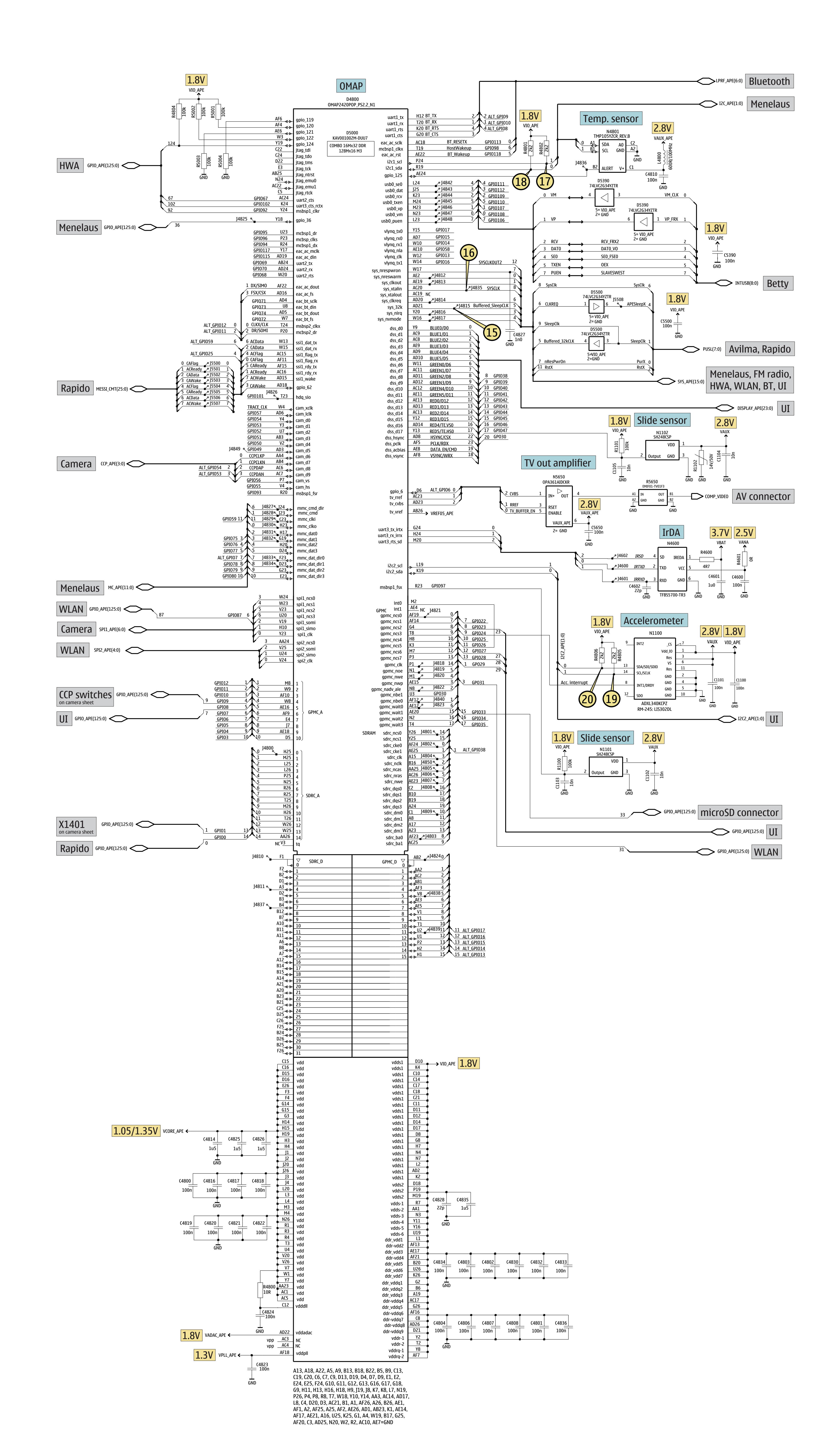


Slide PWB
FM radio
Int. microphone
AVilma
N2200
AVILMA_1.05C
AV connector
3.7V
Audio amplifier
N2120
TPA2012D2YZH
IHF speaker
Power key
3.7V (unpressed)
Auto powerup pads
Slide PWB
RF part
1.8V if N2120 is active
Rapido
4.7V
1.8V
1.8V
2.5V
1.8V
1.8V
2.8V
2.5V
1.35V
BTEMP NTC
Rapido
RF part
Vibra
Battery connector
3.7V
SIM connector
7 1.8/3V
1.8V
3.7V
0V: sleep
1.8V: active
Betty
N2300
BETTY_V2.1_LF
Rapido, OMAP, GPS
Rapido
AV connector
Rapido
Flash interface
Charger plug
5V
USB connector
2.5V
5V
1.8V
Rapido, OMAP
UI, illumination

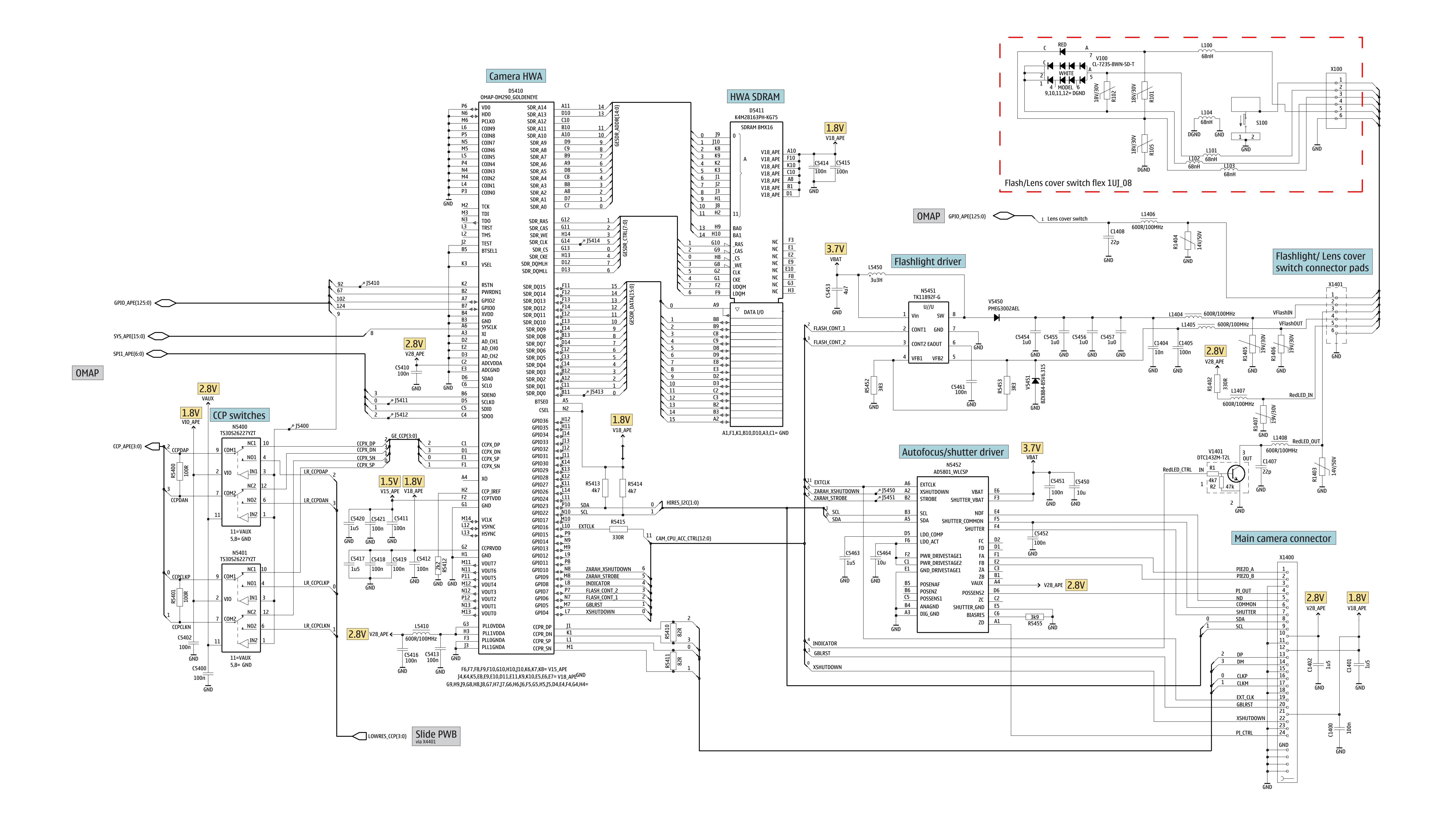

Rapido
CMT memories
RF part
Avilma, Betty
Avilma
Bluetooth
Betty
GPS antenna pads
GPS
3.7V
RF part
2.5V
1.45V
1.35V
1.5V
1.5V
1.1V
1.8V
Avilma
OMAP
UI, illumination
AV connector
OMAP
Avilma, Betty, OMAP
1.8V
1.8V
FM radio
AV connector
Avilma
OMAP
Rapido Vcore SMPS
3.7V
1.05/1.35V
2.8V
1.8V
1.8V
1.8V
1.8V



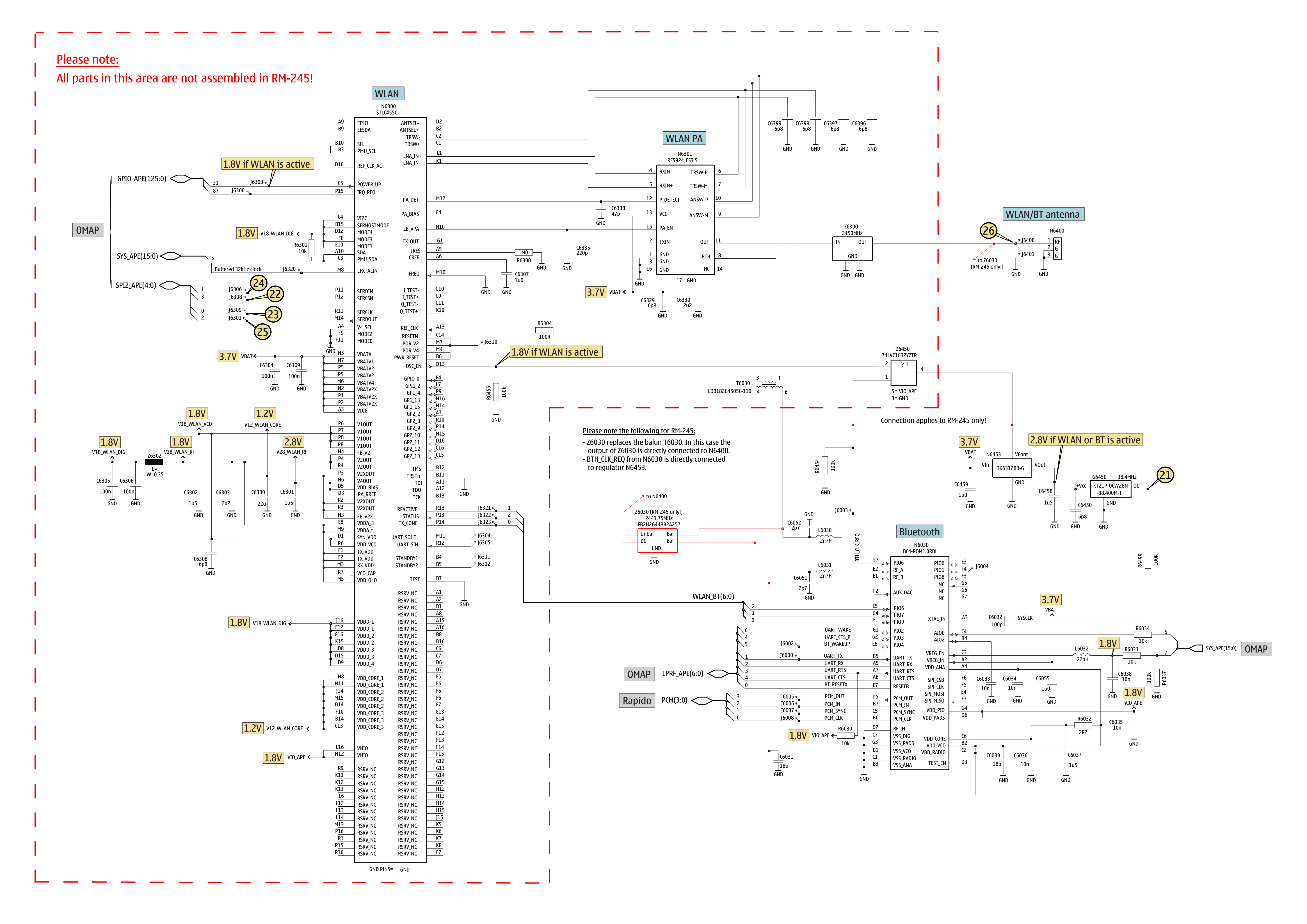
Menelaus
N4200
MENELAUS1_V2.2
3.7V
VBAT
VCORE_APE
1.05/1.35V
VIO_APE
1.8V
V28_APE
2.8V
V18_APE
1.8V
VAUX_APE
2.8V
V15_APE
1.5V
VPLL_APE
1.3V
VADAC_APE
1.8V
VREF05_APE
0.5V
3V
1.8V
VIO_APE
microSD connector
Z5200
EMIF09-SD01F3
X5250
OMAP
SYS_APE(15:0)
I2C_APE(1:0)
MC_APE(11:0)
GPIO_APE(125:0)
RSTX from Avilma
SYSCLK
CLK
CMD
DAT0
DAT1
DAT2
DAT3
Card detect
CD pre-warning
Vdd
GND

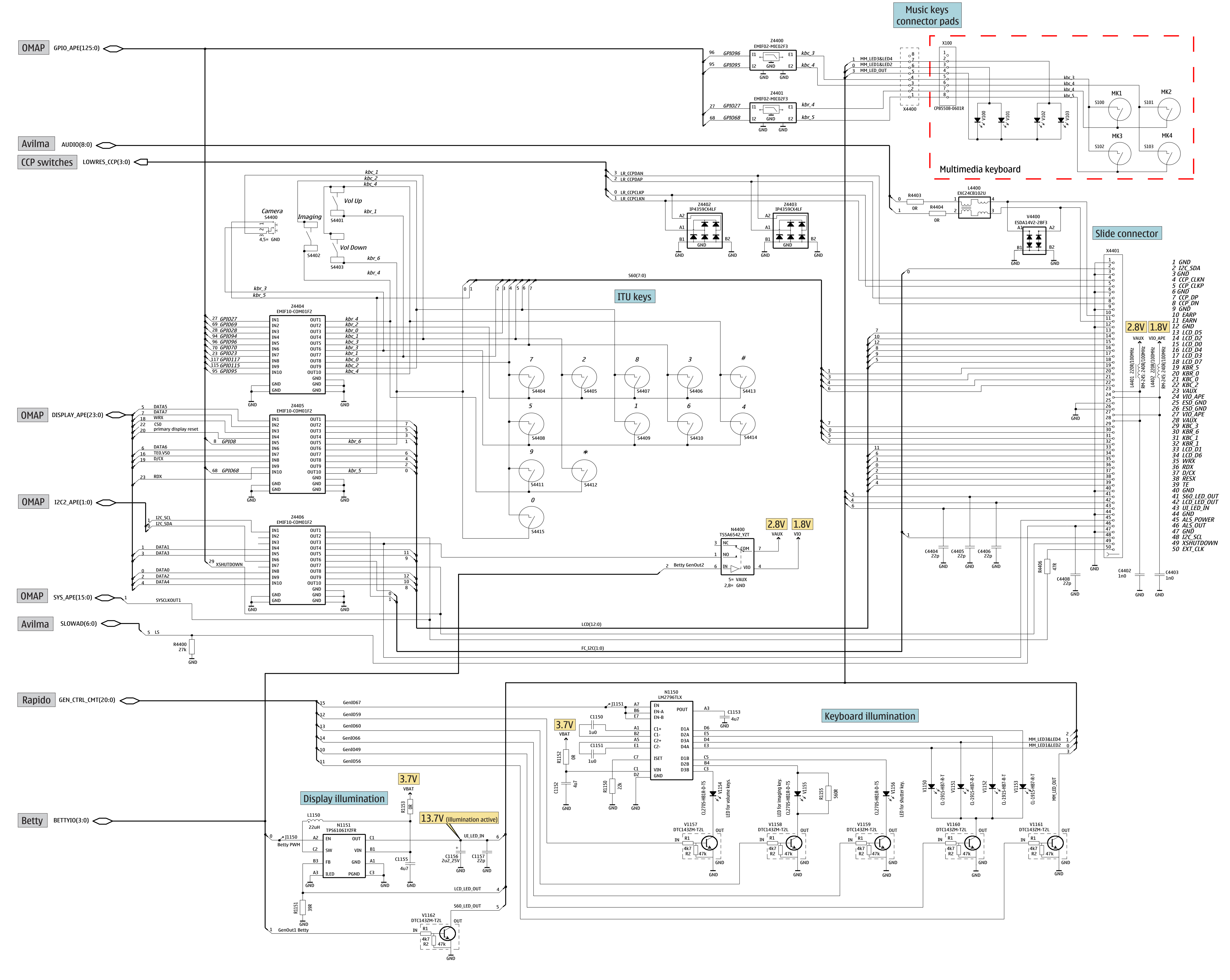


OMAP
D4800
OMAP2420POP_PS2.2_N1
D5000
1.8V
2.8V
3.7V
2.5V
1.05/1.35V
1.3V
Bluetooth
Menelaus
Temp. sensor
HWA
Betty
Rapido
Avilma, Rapido
Menelaus, FM radio, HWA, WLAN, BT, UI
UI
Camera
Slide sensor
TV out amplifier
AV connector
IrDA
WLAN
CCP switches
on camera sheet
Accelerometer
X1401
microSD connector

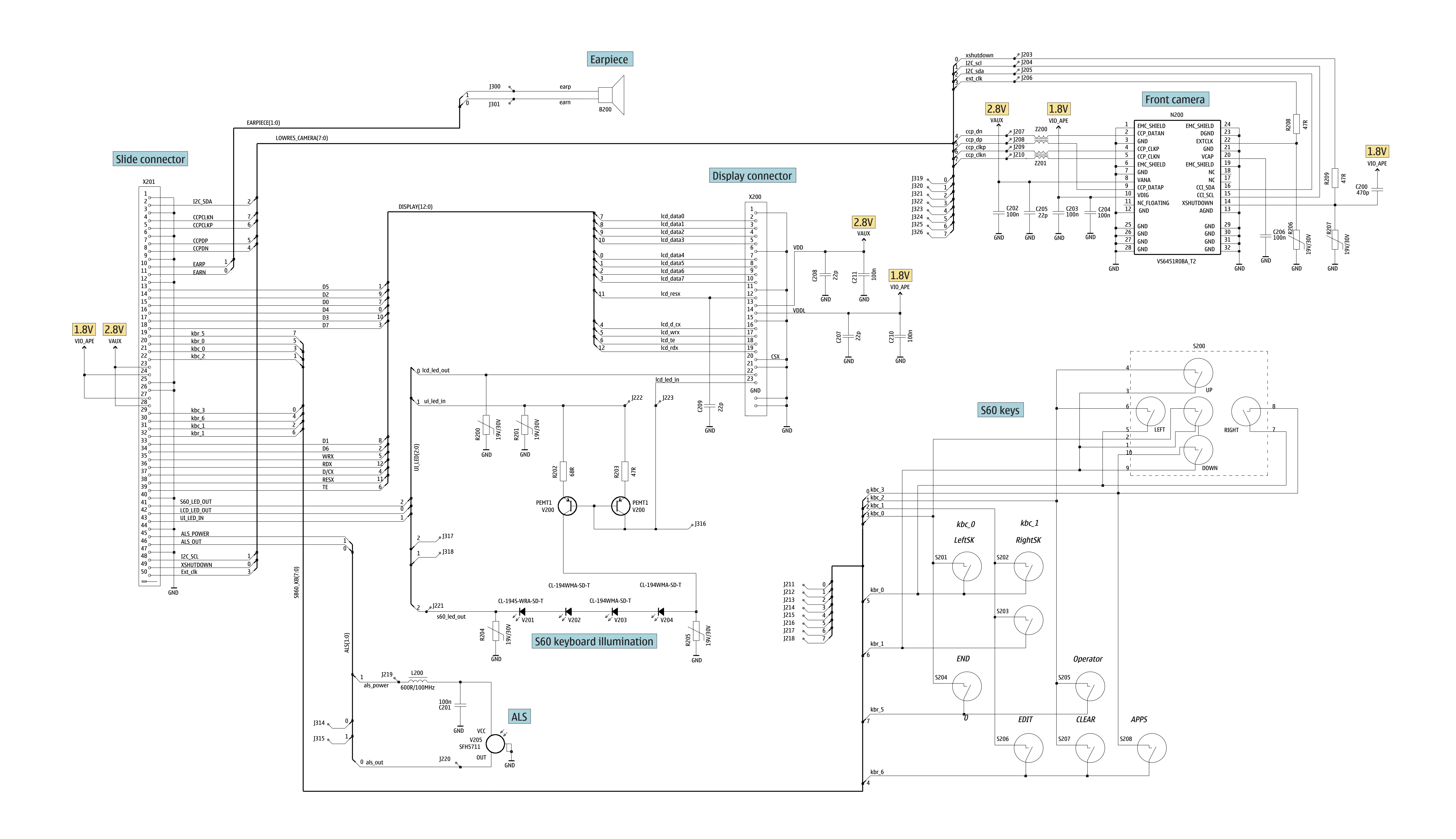


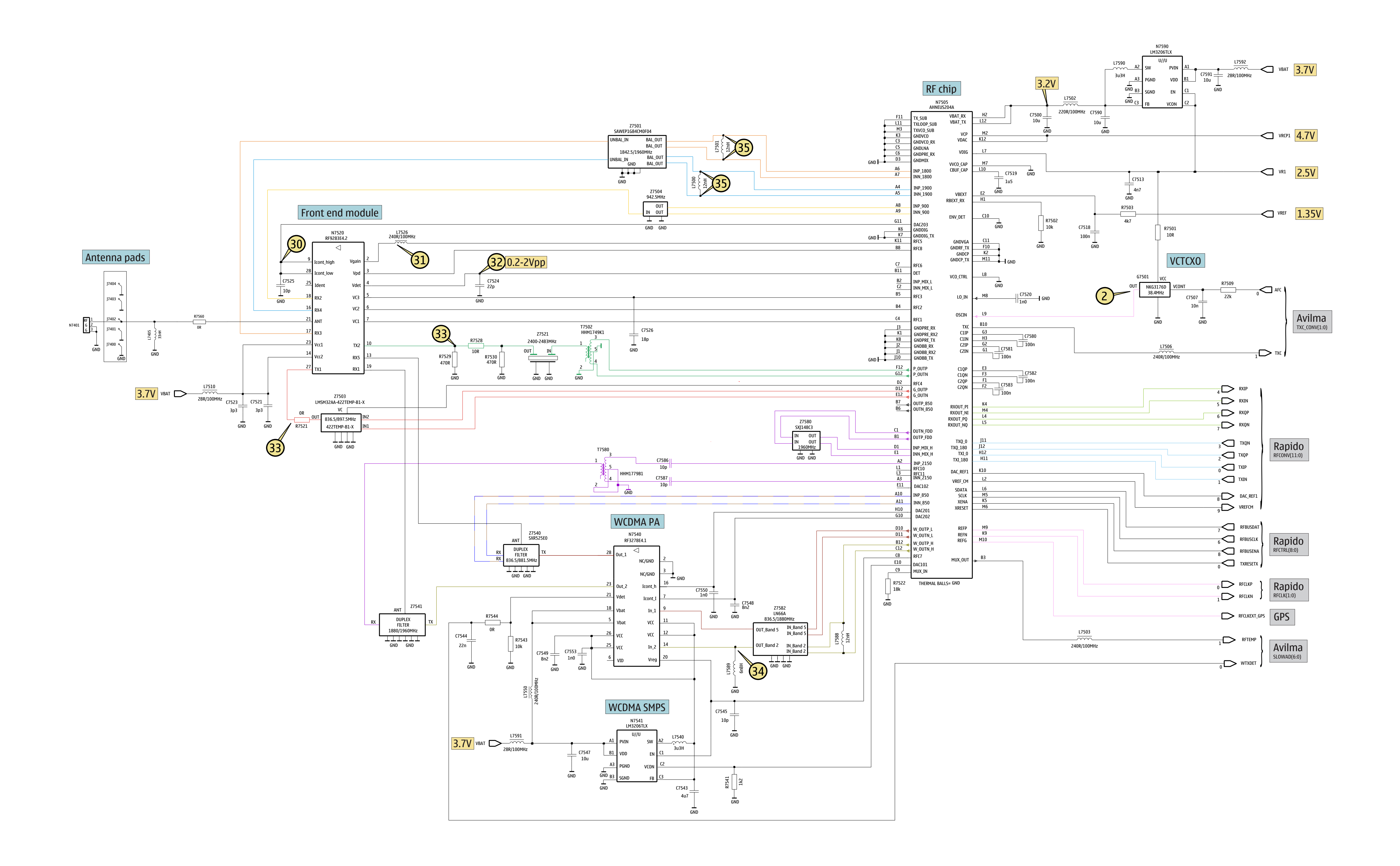
Camera HWA
HWA SDRAM
Flash/Lens cover switch flex 1UJ_08
OMAP
Flashlight driver
Flashlight/ Lens cover switch connector pads
CCP switches
Autofocus/shutter driver
Main camera connector
Slide PWB


Please note:
All parts in this area are not assembled in RM-245!
WLAN
N6300
STLC4550
WLAN PA
N6301
RF5924_ES3.5
WLAN/BT antenna
OMAP
GPIO_APE(125:0)
SYS_APE(15:0)
SPI2_APE(4:0)
1.8V if WLAN is active
Buffered 32kHz clock
1.8V
3.7V
1.2V
2.8V
V18_WLAN_DIG
V18_WLAN_VCO
V12_WLAN_CORE
V18_WLAN_RF
V28_WLAN_RF
VBAT
VIO_APE
17= GND
Z6300
2450MHz
N6400
to Z6030
(RM-245 only!)
D6450
74LVC1G32YZTR
5= VIO_APE
3= GND
T6030
LDB182G4505C-110
Connection applies to RM-245 only!
Please note the following for RM-245:
- Z6030 replaces the balun T6030. In this case the output of Z6030 is directly connected to N6400.
- BTH_CLK_REQ from N6030 is directly connected to regulator N6453.
to N6400
Z6030 (RM-245 only!)
2441.75MHz
LFB2H2G44BB2A257
2.8V if WLAN or BT is active
N6453
TK63128B-G
G6450
38.4MHz
KT21P-UCW28N
-38.400M-T
Bluetooth
N6030
BC4-ROM1.0RDL
WLAN_BT(6:0)
LPRF_APE(6:0)
Rapido
PCM(3:0)
SYS_APE(15:0)
GND PINS= GND

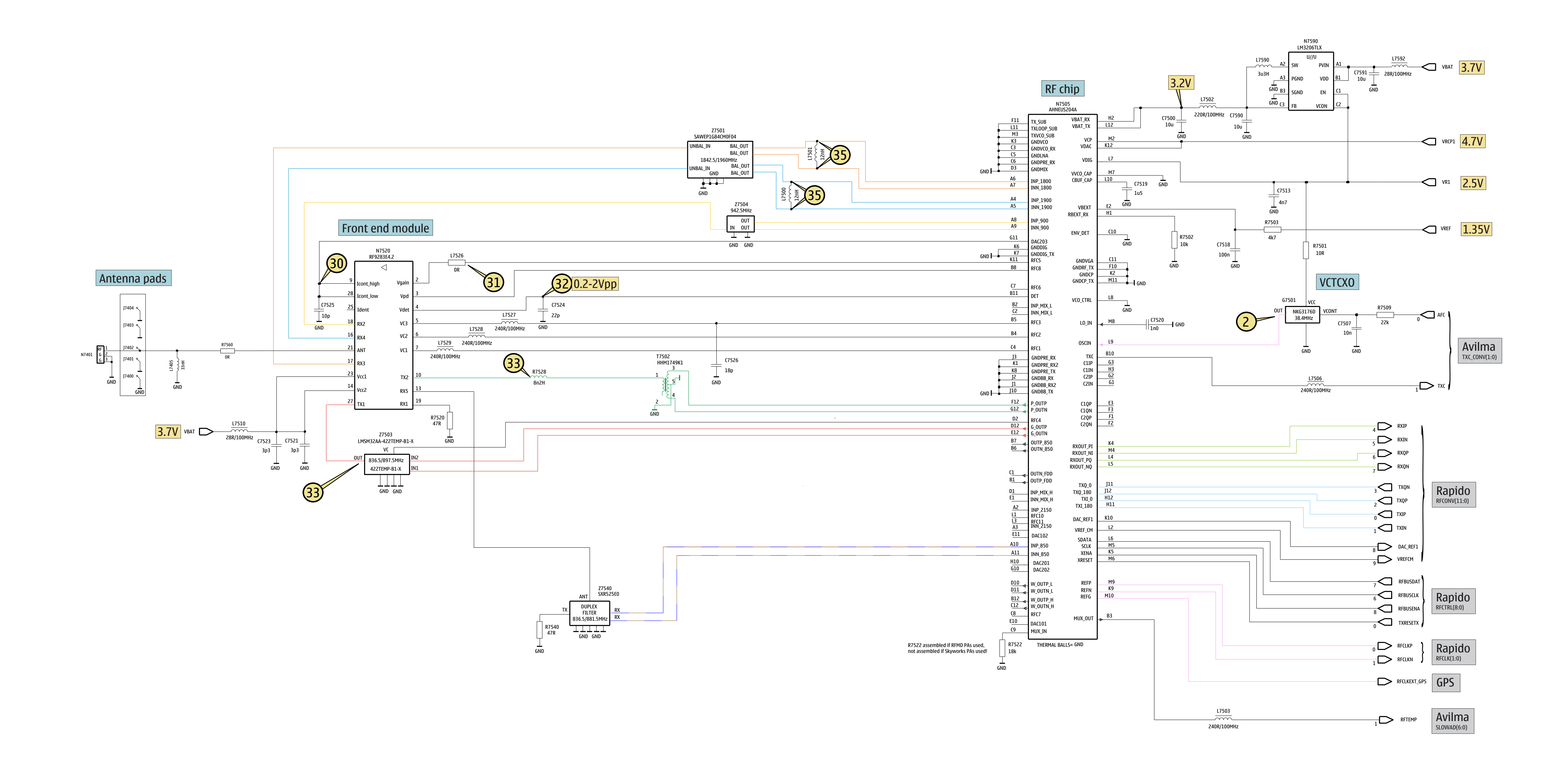


Music keys connector pads
Multimedia keyboard
Slide connector
ITU keys
Keyboard illumination
Display illumination
OMAP
Avilma
CCP switches
Rapido
Betty
2.8V
1.8V
3.7V
13.7V (illumination active)

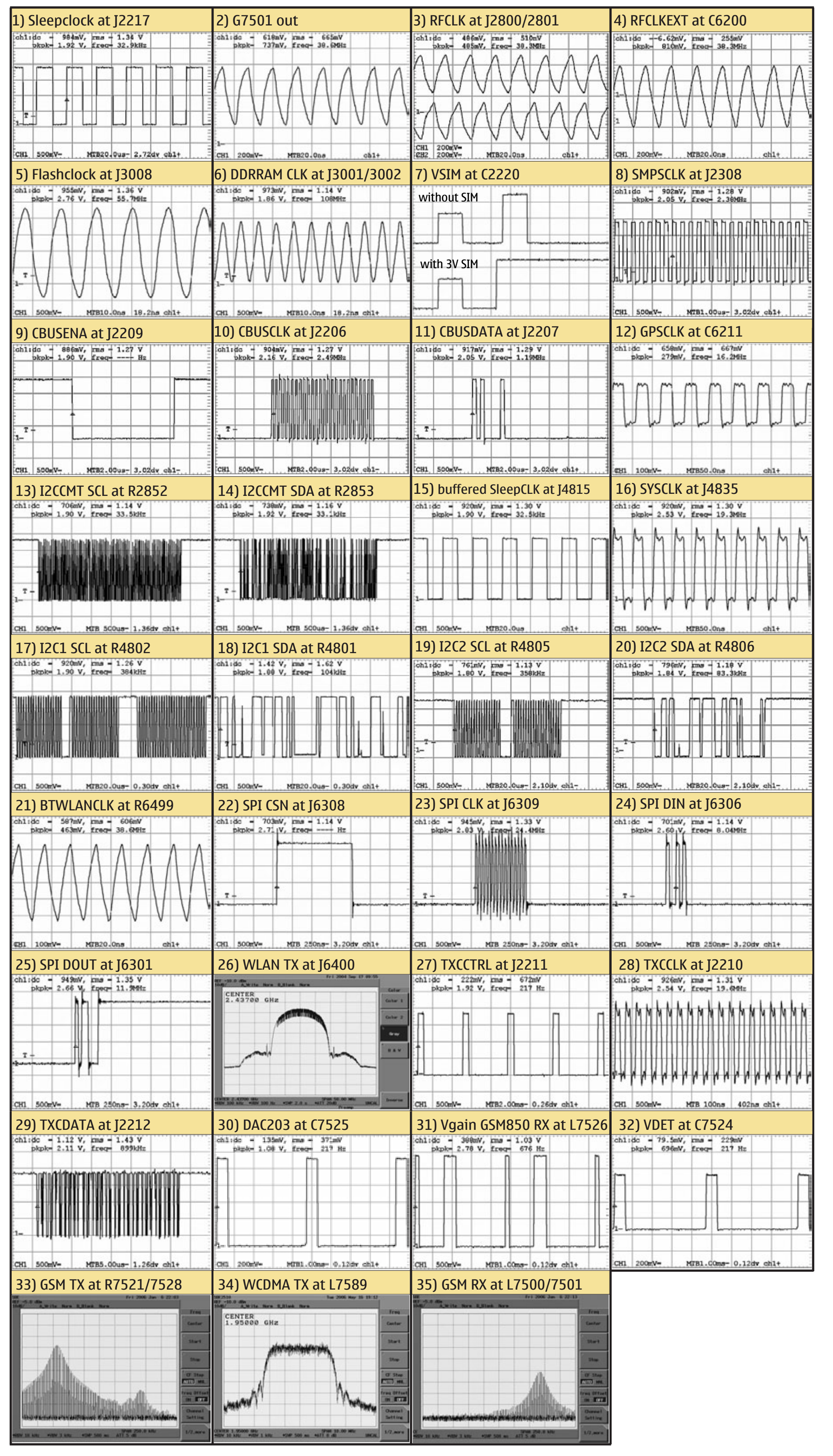

Earpiece
Front camera
Slide connector
Display connector
S60 keys
S60 keyboard illumination
ALS
1.8V
2.8V
VIO_APE
VAUX
X201
X200
N200
VS6451R0BA_T2
S200
UP
LEFT
RIGHT
DOWN
kbc_0
kbc_1
LeftSK
RightSK
END
Operator
EDIT
CLEAR
APPS
B200
V205
SFH5711
L200
600R/100MHz
GND

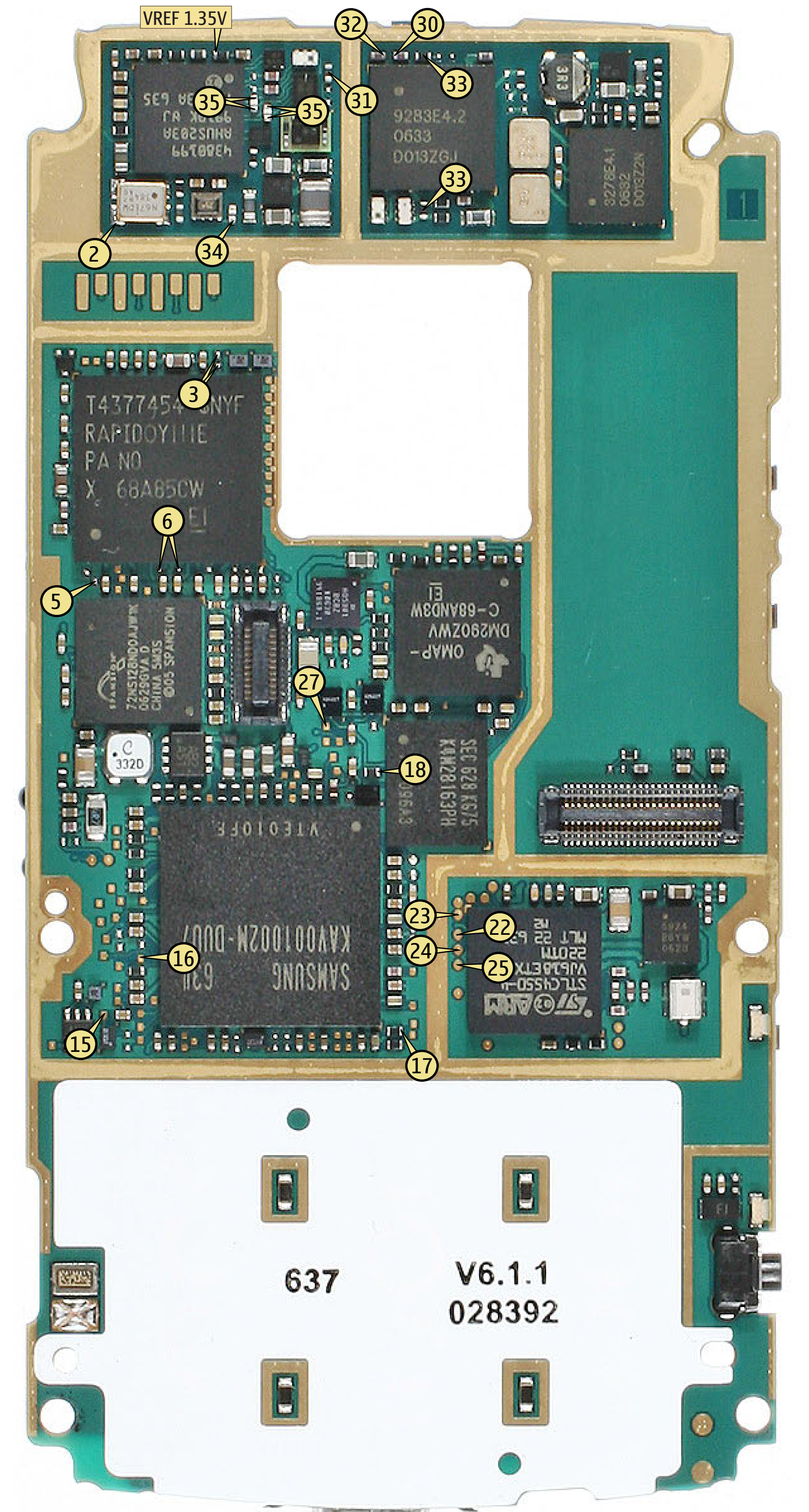


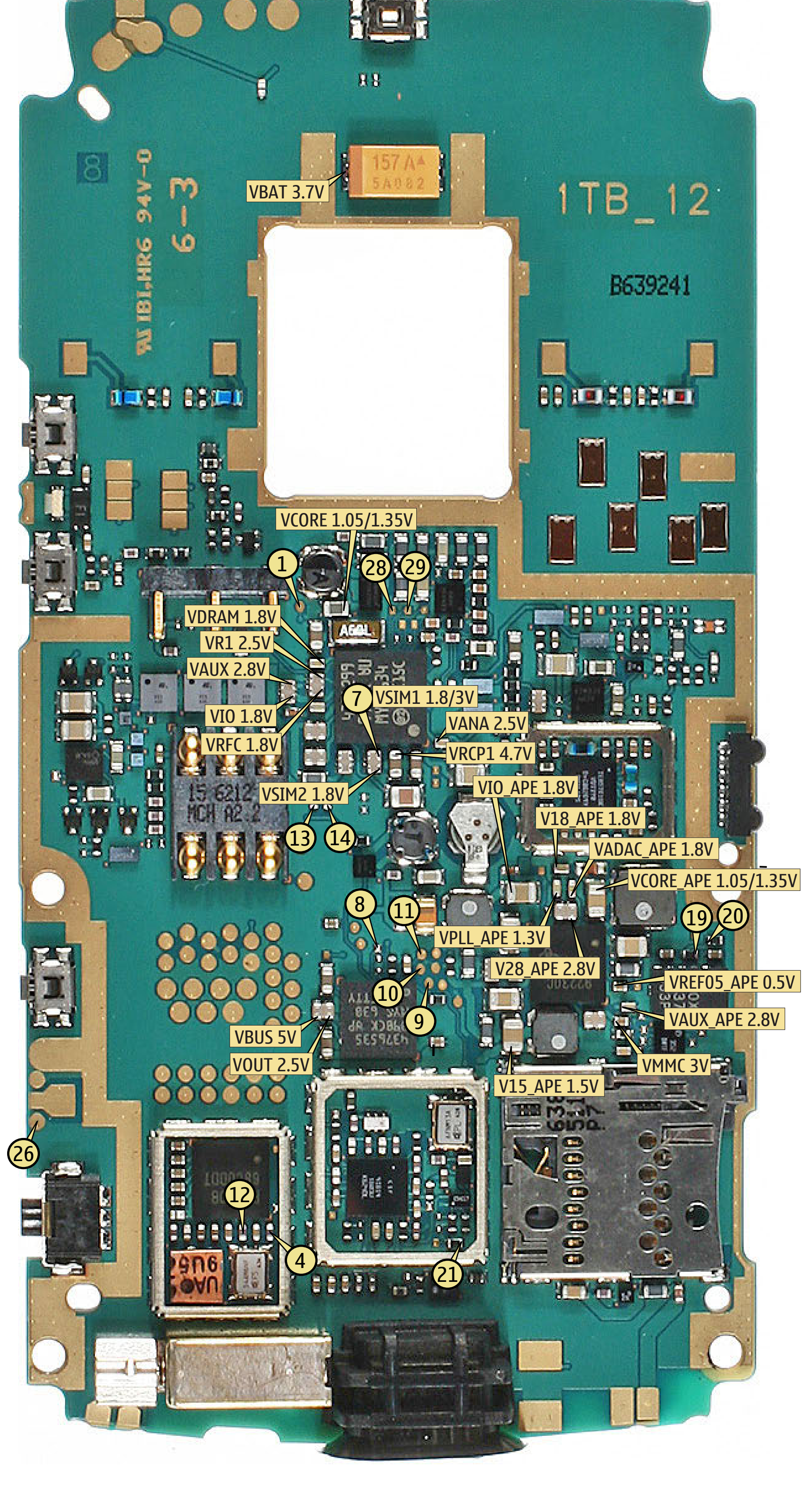
RF chip
N7505
3.2V
3.7V
4.7V
2.5V
1.35V
VCTCXO
Avilma
Front end module
Antenna pads
WCDMA PA
WCDMA SMPS
Rapido
GPS
0.2-2Vpp

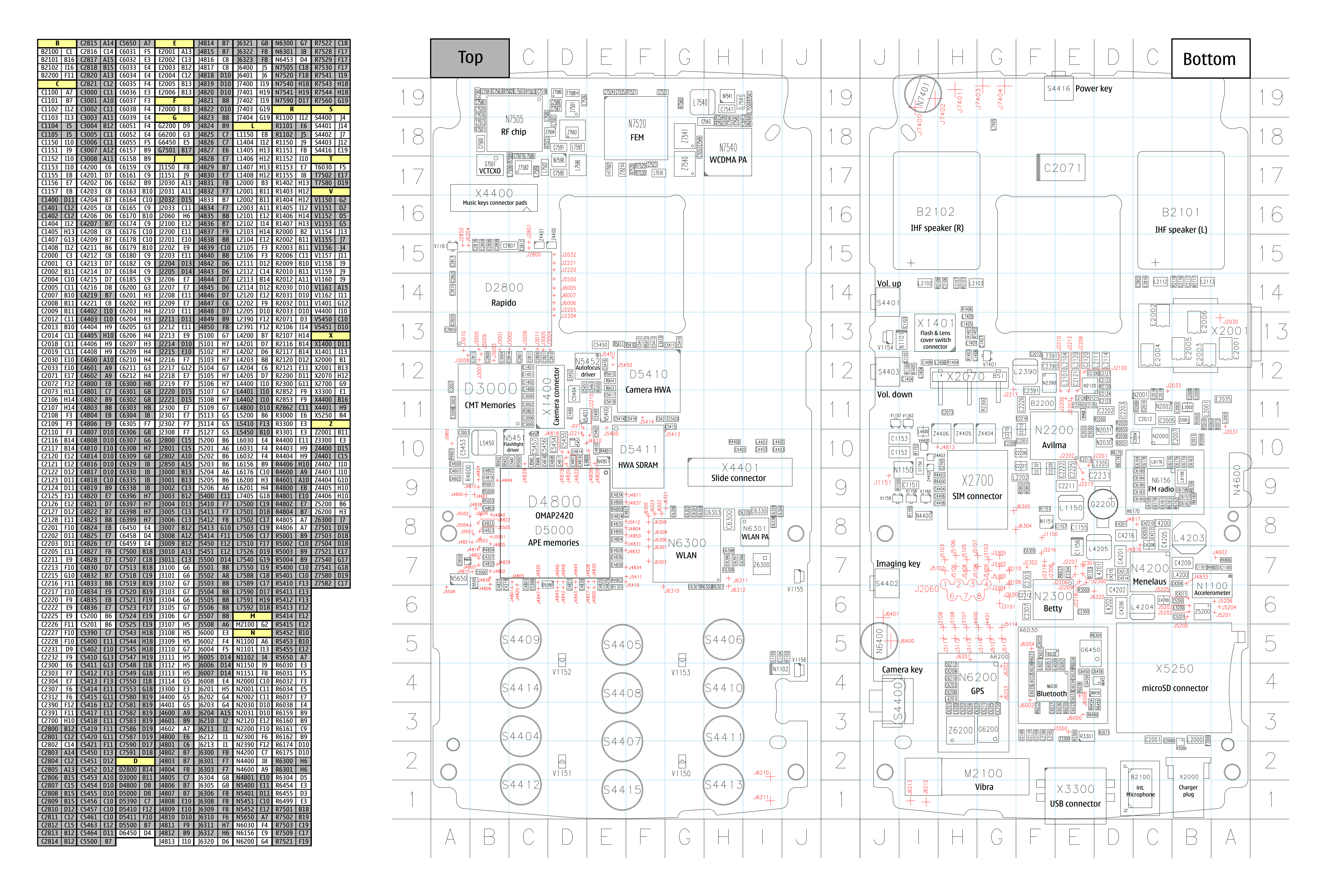


RF chip
Front end module
Antenna pads
VCTCXO
Avilma
TXC_CONV(1:0)
Rapido
RFCONV(11:0)
Rapido
RFCTRL(8:0)
Rapido
RFCLK(1:0)
GPS
Avilma
SLOWAD(6:0)
3.7V
4.7V
2.5V
1.35V
3.2V
0.2-2Vpp
N7505
AHNEU5204A
N7520
RF9283E4.2
N7590
LM3206TLX
Z7501
SAWEP1G84CM0F04
Z7503
LMSM32AA-422TEMP-B1-X
Z7540
SXR525E0
G7501
NKG3176D
38.4MHz
T7502
HHM1749K1
R7522 assembled if RFMD PAs used,
not assembled if Skyworks PAs used!
THERMAL BALLS= GND


1) Sleepclock at J2217
2) G7501 out
3) RFCLK at J2800/2801
4) RFCLKEXT at C6200
5) Flashclock at J3008
6) DDRRAM CLK at J3001/3002
7) VSIM at C2220
without SIM
with 3V SIM
8) SMPSCLK at J2308
9) CBUSENA at J2209
10) CBUSCLK at J2206
11) CBUSDATA at J2207
12) GPSCLK at C6211
13) I2CCMT SCL at R2852
14) I2CCMT SDA at R2853
15) buffered SleepCLK at J4815
16) SYSCLK at J4835
17) I2C1 SCL at R4802
18) I2C1 SDA at R4801
19) I2C2 SCL at R4805
20) I2C2 SDA at R4806
21) BTWLANCLK at R6499
22) SPI CSN at J6308
23) SPI CLK at J6309
24) SPI DIN at J6306
25) SPI DOUT at J6301
26) WLAN TX at J6400
27) TXCCTRL at J2211
28) TXCCLK at J2210
29) TXCDATA at J2212
30) DAC203 at C7525
31) Vgain GSM850 RX at L7526
32) VDET at C7524
33) GSM TX at R7521/7528
34) WCDMA TX at L7589
35) GSM RX at L7500/7501


VREF 1.35V
637
V6.1.1
028392


VBAT 3.7V
1TB_12
B639241
VCORE 1.05/1.35V
VDRAM 1.8V
VR1 2.5V
VAUX 2.8V
VIO 1.8V
VRFC 1.8V
VSIM2 1.8V
VSIM1 1.8/3V
VANA 2.5V
VRCP1 4.7V
VIO_APE 1.8V
V18_APE 1.8V
VADAC_APE 1.8V
VCORE_APE 1.05/1.35V
VPLL_APE 1.3V
V28_APE 2.8V
VREF05_APE 0.5V
VAUX_APE 2.8V
VMMC 3V
V15_APE 1.5V
VBUS 5V
VOUT 2.5V



B		C2815	A14	C5650	A7	E		J4814	B7	J6321	G8	N6300	G7	R7522	C18
B2100	C1	C2816	C14	C6031	F5	E2001	A13	J4815	B7	J6322	F8	N6301	I8	R7528	F17
B2101	B16	C2817	A15	C6032	E3	E2002	C13	J4816	C8	J6323	F8	N6453	D4	R7529	F17
B2102	I16	C2818	B15	C6033	E4	E2003	B12	J4817	C8	J6400	J5	N7505	C18	R7530	F17
B2200	F11	C2820	A13	C6034	E4	E2004	C12	J4818	D10	J6401	J6	N7520	F18	R7541	I19
C		C2821	C12	C6035	F4	E2005	B13	J4819	D10	J7400	I19	N7540	H18	R7543	H18
C1100	A7	C3000	C11	C6036	E3	E2006	B13	J4820	D10	J7401	H19	N7541	H19	R7544	H18
C1101	B7	C3001	A10	C6037	F3	F		J4821	B8	J7402	I19	N7590	D17	R7560	G19
C1102	I12	C3002	C11	C6038	F4	F2000	B3	J4822	D10	J7403	G19	R		S	
C1103	I13	C3003	A11	C6039	E4	G		J4823	B8	J7404	G19	R1100	I12	S4400	J4
C1104	I5	C3004	B12	C6051	F4	G2200	D9	J4824	B9	L		R1101	E6	S4401	J14
C1105	I5	C3005	C11	C6052	E4	G6200	G3	J4825	C7	L1150	E8	R1102	J5	S4402	J7
C1150	I10	C3006	C11	C6055	F5	G6450	E5	J4826	C7	L1404	I12	R1150	J9	S4403	J12
C1151	I9	C3007	A12	C6157	B9	G7501	B17	J4827	E6	L1405	H13	R1151	F8	S4416	E19
C1152	I10	C3008	A11	C6158	B9	J		J4828	E7	L1406	H12	R1152	I10	T	
C1153	I10	C4200	C6	C6159	C9	J1150	F8	J4829	B7	L1407	H13	R1153	E7	T6030	F5
C1155	E8	C4201	D7	C6161	C9	J1151	J9	J4830	E7	L1408	H12	R1155	I8	T7502	E17
C1156	E7	C4202	D6	C6162	B9	J2030	A13	J4831	F8	L2000	B3	R1402	H13	T7580	D19
C1157	E8	C4203	C8	C6163	B10	J2031	A11	J4832	F7	L2001	B11	R1403	H12	V	
C1400	D11	C4204	B7	C6164	C10	J2032	D15	J4833	B7	L2002	B11	R1404	H12	V1150	G2
C1401	C12	C4205	C8	C6165	C9	J2033	C11	J4834	F7	L2003	A11	R1405	I12	V1151	D2
C1402	C12	C4206	D6	C6170	B10	J2060	H6	J4835	B8	L2101	E12	R1406	H14	V1152	D5
C1404	I12	C4207	B7	C6174	C9	J2100	E12	J4836	B7	L2102	I14	R1407	H13	V1153	G5
C1405	H13	C4208	C8	C6176	C10	J2200	E11	J4837	F9	L2103	H14	R2000	B2	V1154	J13
C1407	G13	C4209	B7	C6178	C10	J2201	E10	J4838	B8	L2104	E12	R2002	B11	V1155	J7
C1408	I12	C4211	B6	C6179	B10	J2202	E9	J4839	C10	L2105	F3	R2003	B11	V1156	J4
C2000	C3	C4212	C8	C6180	C9	J2203	E11	J4840	B8	L2106	F3	R2006	C11	V1157	J11
C2001	C3	C4213	D7	C6182	C9	J2204	D13	J4842	D6	L2111	D12	R2009	B10	V1158	I9
C2002	B11	C4214	D7	C6184	C9	J2205	D14	J4843	D6	L2112	C14	R2010	B11	V1159	J9
C2004	C10	C4215	D7	C6185	C9	J2206	E7	J4844	D7	L2113	B14	R2012	A11	V1160	I9
C2005	C11	C4216	D8	C6200	G3	J2207	E7	J4845	D6	L2114	D12	R2030	D10	V1161	A15
C2007	B10	C4219	B7	C6201	H3	J2208	E11	J4846	D7	L2120	E12	R2031	D10	V1162	I11
C2008	B11	C4221	C8	C6202	H3	J2209	E7	J4847	C6	L2202	F9	R2032	D11	V1401	G12
C2009	B11	C4402	I10	C6203	H4	J2210	E11	J4848	D7	L2205	D10	R2033	D10	V4400	I10
C2012	C11	C4403	I10	C6204	H3	J2211	D11	J4849	B9	L2390	F12	R2071	D3	V5450	C10
C2013	B10	C4404	H9	C6205	G3	J2212	E11	J4850	F8	L2391	F12	R2106	I14	V5451	D10
C2014	C11	C4405	H10	C6206	H4	J2213	E9	J5100	G7	L4200	B7	R2107	H14	X	
C2018	C11	C4406	H9	C6207	H3	J2214	D10	J5101	H7	L4201	D7	R2116	B14	X1400	D11
C2019	C11	C4408	H9	C6209	H4	J2215	E10	J5102	H7	L4202	D6	R2117	B14	X1401	I13
C2030	E10	C4600	A10	C6210	H4	J2216	F7	J5103	H7	L4203	B8	R2120	D12	X2000	B1
C2033	E10	C4601	A9	C6211	G3	J2217	G12	J5104	G7	L4204	C6	R2121	E11	X2001	B13
C2071	E17	C4602	A9	C6212	H4	J2218	E7	J5105	H7	L4205	D7	R2200	D11	X2070	H12
C2072	F12	C4800	E8	C6300	H8	J2219	F7	J5106	H7	L4400	I10	R2300	G11	X2700	G9
C2073	H11	C4801	C7	C6301	G8	J2220	D15	J5107	G7	L4401	I10	R2852	F9	X3300	E1
C2106	H14	C4802	B9	C6302	G8	J2221	D15	J5108	H7	L4402	I10	R2853	F9	X4400	B16
C2107	H14	C4803	B8	C6303	H8	J2300	E7	J5109	G7	L4800	D10	R2862	C11	X4401	H9
C2108	F3	C4804	E8	C6304	I8	J2301	E7	J5113	G5	L5200	B6	R3000	E6	X5250	B4
C2109	F3	C4806	E9	C6305	F7	J2302	F7	J5114	G5	L5410	F13	R3300	E3	Z	
C2110	F3	C4807	D10	C6306	G8	J2308	F7	J5127	G5	L5450	B10	R3301	E3	Z2001	B11
C2116	B14	C4808	D10	C6307	G6	J2800	C15	J5200	B6	L6030	E4	R4400	E11	Z3300	E3
C2117	B14	C4810	E10	C6308	H7	J2801	C15	J5201	A6	L6031	F4	R4403	H9	Z4400	D15
C2120	E12	C4814	D10	C6309	G8	J2802	A10	J5202	B6	L6032	F4	R4404	H9	Z4401	C15
C2121	E12	C4816	D10	C6329	I8	J2850	A15	J5203	B6	L6156	B9	R4406	H10	Z4402	I10
C2122	D12	C4817	D10	C6330	I8	J3000	B13	J5204	A6	L6176	C10	R4600	A9	Z4403	I10
C2123	D11	C4818	C10	C6335	I8	J3001	B13	J5205	B6	L6200	H3	R4601	A10	Z4404	G10
C2124	D11	C4819	B9	C6338	I8	J3002	C13	J5206	A6	L6201	H4	R4800	E8	Z4405	H10
C2125	E11	C4820	E7	C6396	H7	J3003	B12	J5400	E11	L7405	G18	R4801	E10	Z4406	H10
C2126	E12	C4821	D7	C6397	H7	J3004	D13	J5410	F7	L7500	C19	R4802	E7	Z5200	B6
C2127	D12	C4822	B7	C6398	H7	J3005	C13	J5411	F7	L7501	D18	R4804	B7	Z6200	H3
C2128	E11	C4823	B8	C6399	H7	J3006	C13	J5412	F8	L7502	C17	R4805	A7	Z6300	I7
C2201	F10	C4824	E8	C6450	E4	J3007	B12	J5413	G10	L7503	C19	R4806	A7	Z7501	D19
C2202	D11	C4825	E7	C6458	D4	J3008	A12	J5414	F11	L7506	C17	R5001	B9	Z7503	D18
C2203	D11	C4826	E7	C6459	E4	J3009	B12	J5450	E12	L7510	F17	R5002	C10	Z7504	D18
C2205	E11	C4827	F8	C7500	B18	J3010	A13	J5451	E12	L7526	D19	R5003	B9	Z7521	E17
C2211	E9	C4828	E7	C7507	C18	J3011	C13	J5500	D14	L7540	G19	R5004	B9	Z7540	G17
C2213	F10	C4830	D7	C7513	B18	J3100	G6	J5501	B8	L7550	I19	R5400	C10	Z7541	G18
C2215	G10	C4832	B7	C7518	C19	J3101	G6	J5502	A8	L7588	C18	R5401	C10	Z7580	D19
C2216	F11	C4833	B8	C7519	B19	J3102	G7	J5503	B8	L7589	C17	R5410	F13	Z7582	C17
C2217	E10	C4834	E9	C7520	B19	J3103	G7	J5504	B8	L7590	D17	R5411	E13		
C2220	F9	C4835	E8	C7521	F19	J3104	G6	J5505	B8	L7591	H19	R5412	F13		
C2222	E9	C4836	E7	C7523	F17	J3105	G7	J5506	B8	L7592	D18	R5413	E12		
C2225	E9	C5200	B6	C7524	E19	J3106	G7	J5507	B8	M		R5414	E12		
C2226	F11	C5201	B6	C7525	E19	J3107	H5	J5508	A6	M2100	G2	R5415	E12		
C2227	F10	C5390	C7	C7543	H18	J3108	H5	J6000	E3	N		R5452	B10		
C2228	F10	C5400	E11	C7544	H18	J3109	H5	J6002	F4	N1100	A6	R5453	B10		
C2231	D9	C5402	E10	C7545	H18	J3110	G7	J6004	F5	N1101	I13	R5455	E12		
C2232	F9	C5410	G13	C7547	H19	J3111	H5	J6005	D14	N1102	I4	R5650	A7		
C2300	E6	C5411	G13	C7548	I18	J3112	H5	J6006	D14	N1150	I9	R6030	E3		
C2303	F7	C5412	F13	C7549	G18	J3113	H5	J6007	D14	N1151	F8	R6031	F5		
C2304	E7	C5413	F13	C7550	I18	J3114	G5	J6008	E4	N2000	C10	R6032	F3		
C2307	F6	C5414	E11	C7553	G18	J3300	E3	J6201	H5	N2001	C11	R6034	E5		
C2312	F6	C5415	G11	C7580	B19	J4400	G5	J6202	G4	N2002	C11	R6037	E7		
C2390	F12	C5416	E12	C7581	B19	J4401	G5	J6203	G4	N2030	D10	R6038	E4		
C2391	F11	C5417	E11	C7582	B19	J4600	A9	J6204	A15	N2031	D10	R6159	B9		
C2700	H10	C5418	E11	C7583	B19	J4601	B9	J6210	I2	N2120	E12	R6160	B9		
C2800	B12	C5419	F11	C7586	D19	J4602	A7	J6211	I1	N2200	F10	R6161	C9		
C2801	C12	C5420	G11	C7587	D19	J4800	E6	J6212	I1	N2300	F6	R6162	B9		
C2802	C14	C5421	F11	C7590	D17	J4801	C6	J6213	I1	N2390	F12	R6174	D10		
C2803	A14	C5450	E13	C7591	D18	J4802	B7	J6300	F8	N4200	C7	R6175	D10		
C2804	C12	C5451	D12	D		J4803	B7	J6301	F7	N4400	I8	R6300	H6		
C2805	A13	C5452	D12	D2800	B14	J4804	F8	J6303	F7	N4600	A9	R6301	H6		
C2806	B15	C5453	A10	D3000	B11	J4805	C7	J6304	G8	N4801	E10	R6304	D5		
C2807	C15	C5454	D10	D4800	D8	J4806	B7	J6305	G8	N5400	E11	R6454	E3		
C2808	B15	C5455	D10	D5000	D8	J4807	B7	J6306	F8	N5401	D11	R6455	D3		
C2809	B15	C5456	C10	D5390	C7	J4808	E10	J6308	F8	N5451	C10	R6499	E3		
C2810	D12	C5457	C10	D5410	F12	J4809	E10	J6309	F8	N5452	E12	R7501	B18		
C2811	C12	C5461	C10	D5411	F10	J4810	D10	J6310	F6	N5650	A7	R7502	B19		
C2812	C15	C5463	E12	D5500	B7	J4811	F9	J6311	H7	N6030	F4	R7503	C19		
C2813	B12	C5464	D11	D6450	D4	J4812	B9	J6312	H6	N6156	C9	R7509	C17		
C2814	B12	C5500	B7			J4813	I10	J6320	D6	N6200	G4	R7521	F19		

B		C2816	C14	C6032	E3	J2214	D10	J5102	H7	L6200	H3	R5001	B9
B2100	C1	C2817	A15	C6033	E4	J2215	E10	J5103	H7	L6201	H4	R5002	C10
B2101	B16	C2818	B15	C6034	E4	J2216	F7	J5104	G7	L7405	G18	R5003	B9
B2102	I16	C2820	A13	C6035	F4	J2217	G12	J5105	H7	L7500	C19	R5004	B9
B2200	F11	C2821	C12	C6036	E3	J2218	E7	J5106	H7	L7501	D18	R5400	C10
C		C3000	C11	C6037	F3	J2219	F7	J5107	G7	L7502	C17	R5401	C10
C1100	A7	C3001	A10	C6038	F4	J2220	D15	J5108	H7	L7503	C19	R5410	F13
C1101	B7	C3002	C11	C6039	E4	J2221	D15	J5109	G7	L7506	C17	R5411	E13
C1102	I12	C3003	A11	C6051	F4	J2300	E7	J5113	G5	L7510	F17	R5412	F13
C1103	I13	C3004	B12	C6052	E4	J2301	E7	J5114	G5	L7526	D19	R5413	E12
C1104	J5	C3005	C11	C6055	F5	J2302	F7	J5127	G5	L7527	F19	R5414	E12
C1105	J5	C3006	C11	C6157	B9	J2308	F7	J5200	B6	L7528	F19	R5415	E12
C1150	I10	C3007	A12	C6158	B9	J2800	C15	J5201	A6	L7529	E19	R5452	B10
C1151	I9	C3008	A11	C6159	C9	J2801	C15	J5202	B6	L7590	D17	R5453	B10
C1152	I10	C4200	C6	C6161	C9	J2802	A10	J5203	B6	L7592	D18	R5455	E12
C1153	I10	C4201	D7	C6162	B9	J2850	A15	J5204	A6	**M**		R5650	A7
C1155	E8	C4202	D6	C6163	B10	J3000	B13	J5205	B6	M2100	G2	R6030	E3
C1156	E7	C4203	C8	C6164	C10	J3001	B13	J5206	A6	**N**		R6031	F5
C1157	E8	C4204	B7	C6165	C9	J3002	C13	J5400	E11	N1100	A6	R6032	F3
C1400	D11	C4205	C8	C6170	B10	J3003	B12	J5410	F7	N1101	I13	R6034	E5
C1401	C12	C4206	D6	C6174	C9	J3004	D13	J5411	F7	N1102	I4	R6037	E7
C1402	C12	C4207	B7	C6176	C10	J3005	C13	J5412	F8	N1150	I9	R6038	E4
C1404	I12	C4208	C8	C6178	C10	J3006	C13	J5413	G10	N1151	F8	R6159	B9
C1405	H13	C4209	B7	C6179	B10	J3007	B12	J5414	F11	N2000	C10	R6160	B9
C1407	G13	C4211	B6	C6180	C9	J3008	A12	J5450	E12	N2001	C11	R6161	C9
C1408	I12	C4212	C8	C6182	C9	J3009	B12	J5451	E12	N2002	C11	R6162	B9
C2000	C3	C4213	D7	C6184	C9	J3010	A13	J5500	D14	N2030	D10	R6174	D10
C2001	C3	C4214	D7	C6185	C9	J3011	C13	J5501	B8	N2031	D10	R6175	D10
C2002	B11	C4215	D7	C6200	G3	J3100	G6	J5502	A8	N2120	E12	R6454	E3
C2004	C10	C4216	D8	C6201	H3	J3101	G6	J5503	B8	N2200	F10	R6499	E3
C2005	C11	C4219	B7	C6202	H3	J3102	G7	J5504	B8	N2300	F6	R7501	B18
C2007	B10	C4221	C8	C6203	H4	J3103	G7	J5505	B8	N2390	F12	R7502	B19
C2008	B11	C4402	I10	C6204	H3	J3104	G6	J5506	B8	N4200	C7	R7503	C19
C2009	B11	C4403	I10	C6205	G3	J3105	G7	J5507	B8	N4400	I8	R7509	C17
C2012	C11	C4404	H9	C6206	H4	J3106	G7	J5508	A6	N4600	A9	R7520	G18
C2013	B10	C4405	H10	C6207	H3	J3107	H5	J6000	E3	N4801	E10	R7522	C18
C2014	C11	C4406	H9	C6209	H4	J3108	H5	J6002	F3	N5400	E11	R7528	F17
C2018	C11	C4408	H9	C6210	H4	J3109	H5	J6004	F4	N5401	D11	R7540	G17
C2019	C11	C4600	A10	C6211	G3	J3110	G7	J6005	D14	N5451	C10	R7560	G19
C2030	E10	C4601	A9	C6212	H4	J3111	H5	J6006	D14	N5452	E12	**S**	
C2033	E10	C4602	A9	C6450	E4	J3112	H5	J6007	D14	N5650	A7	S4400	J4
C2071	F17	C4800	E8	C6458	D4	J3113	H5	J6008	E4	N6030	F4	S4401	J14
C2072	F12	C4801	C7	C6459	E4	J3114	G5	J6201	H5	N6156	C9	S4402	J7
C2073	H11	C4802	B9	C7500	B18	J3300	E3	J6202	G4	N6200	G4	S4403	J12
C2106	H14	C4803	B8	C7507	C18	J4400	G5	J6203	G4	N6453	D4	S4416	E19
C2107	H14	C4804	E8	C7513	B18	J4401	G5	J6204	A15	N7505	C18	**T**	
C2108	F3	C4806	E9	C7518	C19	J4600	A9	J6210	I2	N7520	F18	T7502	E17
C2109	F3	C4807	D10	C7519	B19	J4601	B9	J6211	I1	N7590	D17	**V**	
C2110	F3	C4808	D10	C7520	B19	J4602	A7	J6212	I1	**R**		V1150	G2
C2116	B14	C4810	E10	C7521	F19	J4800	E6	J6213	I1	R1100	I12	V1151	D2
C2117	B14	C4814	D10	C7523	F17	J4801	C6	J6400	J5	R1101	E6	V1152	D5
C2120	E12	C4816	D10	C7524	D19	J4802	B7	J6401	J6	R1102	J5	V1153	G5
C2121	E12	C4817	D10	C7525	E19	J4803	B7	J7400	I19	R1150	J9	V1154	J13
C2122	D12	C4818	C10	C7590	D17	J4804	F8	J7401	H19	R1151	F8	V1155	J7
C2123	D11	C4819	B9	C7591	D18	J4805	C7	J7402	I19	R1152	I10	V1156	J4
C2124	D11	C4820	E7	**D**		J4806	B7	J7403	G19	R1153	E7	V1157	J11
C2125	E11	C4821	D7	D2800	B14	J4807	B7	J7404	G19	R1155	I8	V1158	I9
C2126	E12	C4822	B7	D3000	B11	J4808	E10	**L**		R1402	H13	V1159	J9
C2127	D12	C4823	B8	D4800	D8	J4809	E10	L1150	E8	R1403	H12	V1160	I9
C2128	E11	C4824	E8	D5000	D8	J4810	D10	L1404	I12	R1404	H12	V1161	A15
C2201	F10	C4825	E7	D5390	C7	J4811	F9	L1405	H13	R1405	I12	V1162	I11
C2202	D11	C4826	E7	D5410	F12	J4812	B9	L1406	H12	R1406	H14	V1401	G12
C2203	D11	C4827	F8	D5411	F10	J4813	I10	L1407	H13	R1407	H13	V4400	I10
C2205	E11	C4828	E7	D5500	B7	J4814	B7	L1408	H12	R2000	B2	V5450	C10
C2211	E9	C4830	D7	**E**		J4815	B7	L2000	B3	R2002	B11	V5451	D10
C2213	F10	C4832	B7	E2001	A13	J4816	C8	L2001	B11	R2003	B11	**X**	
C2215	G10	C4833	B8	E2002	C13	J4817	C8	L2002	B11	R2006	C11	X1400	D11
C2216	F11	C4834	E9	E2003	B12	J4818	D10	L2003	A11	R2009	B10	X1401	I13
C2217	E10	C4835	E8	E2004	C12	J4819	D10	L2101	E12	R2010	B11	X2000	B1
C2220	F9	C4836	E7	E2005	B13	J4820	D10	L2102	I14	R2012	A11	X2001	B13
C2222	E9	C5200	B6	E2006	B13	J4821	B8	L2103	H14	R2030	D10	X2070	H12
C2225	E9	C5201	B6	**F**		J4822	D10	L2104	E12	R2031	D10	X2700	G9
C2226	F11	C5390	C7	F2000	B3	J4823	B8	L2105	F3	R2032	D11	X3300	E1
C2227	F10	C5400	E11	**G**		J4824	B9	L2106	F3	R2033	D10	X4400	B16
C2228	F10	C5402	E10	G2200	D9	J4825	C7	L2111	D12	R2071	D3	X4401	H9
C2231	D9	C5410	G13	G6200	G3	J4826	C7	L2112	C14	R2106	H14	X5250	B4
C2232	F9	C5411	G13	G6450	E5	J4827	E6	L2113	B14	R2107	H14	**Z**	
C2300	E6	C5412	F13	G7501	B17	J4828	E7	L2114	D12	R2116	B14	Z2001	B11
C2303	F7	C5413	F13	**J**		J4829	B7	L2120	E12	R2117	B14	Z3300	E3
C2304	E7	C5414	E11	J1150	F8	J4830	E7	L2202	F9	R2120	D12	Z4400	D15
C2307	F6	C5415	G11	J1151	J9	J4831	F8	L2205	D10	R2121	E11	Z4401	C15
C2312	F6	C5416	E12	J2030	A13	J4832	F7	L2390	F12	R2200	D11	Z4402	I10
C2390	F12	C5417	E11	J2031	A11	J4833	B7	L2391	F12	R2300	G11	Z4403	I10
C2391	F11	C5418	E11	J2032	D15	J4834	E7	L4200	B7	R2852	F9	Z4404	G10
C2700	H10	C5419	F11	J2033	C11	J4835	B8	L4201	D7	R2853	F9	Z4405	H10
C2800	B12	C5420	G11	J2060	H6	J4836	B7	L4202	D6	R2862	C11	Z4406	H10
C2801	C12	C5421	F11	J2100	E12	J4837	F9	L4203	B8	R3000	E6	Z5200	B6
C2802	C14	C5450	E13	J2200	E11	J4838	B8	L4204	C6	R3300	E3	Z6030	F5
C2803	A14	C5451	D12	J2201	E10	J4839	C10	L4205	D7	R3301	E3	Z6200	H3
C2804	C12	C5452	D12	J2202	E9	J4840	B8	L4400	I10	R4400	E11	Z7501	D19
C2805	A13	C5453	A10	J2203	E11	J4842	D6	L4401	I10	R4403	H9	Z7503	D18
C2806	B15	C5454	D10	J2204	D13	J4843	D6	L4402	I10	R4404	H9	Z7504	D18
C2807	C15	C5455	D10	J2205	D14	J4844	D7	L4800	D10	R4406	H10	Z7540	G17
C2808	B15	C5456	C10	J2206	E7	J4845	D6	L5200	B6	R4600	A9		
C2809	B15	C5457	C10	J2207	E7	J4846	D7	L5410	F13	R4601	A10		
C2810	D12	C5461	C10	J2208	E11	J4847	C6	L5450	B10	R4800	E8		
C2811	C12	C5463	E12	J2209	E7	J4848	D7	L6030	E4	R4801	E10		
C2812	C15	C5464	D11	J2210	E11	J4849	B9	L6031	F4	R4802	E7		
C2813	B12	C5500	B7	J2211	D11	J4850	F8	L6032	F4	R4804	B7		
C2814	B12	C5650	A7	J2212	E11	J5100	G7	L6156	B9	R4805	A7		
C2815	A14	C6031	F5	J2213	E9	J5101	H7	L6176	C10	R4806	A7		

